

# St. Xavier's College – Autonomous Mumbai

# Syllabus For I Semester Courses in Zoology (June 2016 onwards)

#### **Contents:**

Theory Syllabus for Courses:

S.Zoo.1.01 - Invertebrate Systematics and Biomolecules

S.Zoo.1.02 - Genetics and Evolution

Practical Syllabus for Course: S.Zoo.1.PR

## F.Y.B.Sc. Zoology

S.ZOO.1.01

#### INVERTEBRATE SYSTEMATICS AND BIOMOLECULES

#### **Learning Objectives:**

- > To teach student basic classification and characteristics of invertebrates and special adaptations of these phyla
- To understand the structure and functioning of basic biomolecules.

#### **UNIT I**

#### **INVERTEBRATE CLASSIFICATION -I**

- ➤ Salient features and adaptations for Phyla and classes.
  - Phylum Protozoa Reproduction and Skeleton
  - Phylum Porifera- Spicules, canal system
  - Phylum Coelenterata / Cnidaria Polymorphism, Corals and Coral reefs
  - Phylum Platyhelminthes Parasitic adaptations in helminthes
  - Phylum Nematoda Life cycle of ascaris

#### **UNIT II**

#### **INVERTEBRATE CLASSIFICATION -II**

- Salient features and adaptations for Phyla and classes.
  - Phylum Annelida Metamerism and Reproduction
  - Phylum Arthropoda Crustacean larvae
  - Phylum Mollusca Foot and shells, Torsion
  - Phylum Echinodermata Water vascular system

#### **UNIT III**

#### **BIOMOLECULES**

#### > Proteins:

- Amino acids: Structure and types of amino acids (aliphatic, aromatic, essential, nonessential amino acids)
- Definition and structure (primary, secondary, tertiary and quaternary) and types of proteins (fibrous, globular, homonomous, heteronomous and oligomeric)
- Biological role of proteins.

#### > Carbohydrates:

- Definition of carbohydrates and its classification with egs. Monosaccharides –
   Glucose, fructose, galactose. Disaccharides maltose, sucrose, lactose.
   Polysaccharides Starch, glycogen, cellulose, chitin and heparin
- Biological role of Carbohydrates

#### **Lipids:**

- Definition of Lipids, properties and its classification with egs.
- Essential fatty acids and its importance
- Biological role of lipids

#### Nucleic acids:

• Definition of nucleic acids and its types – DNA and RNA

- Structures of purines and pyrimidines
- Types of DNA and RNA and its biological role

#### **REFERENCES:**

- Invertebrate Zoology by E.L Jordan and P.S. Verma
- Invertebrate Zoology by P.S. Dhami and J.K. Dhami
- Modern Textbook of Zoology Invertebrates by Kotpal
- Invertebrate Zoology by Ruppert Barnes
- Biochemistry Lehninger
- Biochemistry Harper
- Biochemistry Conn & Stumpf
- Biochemistry Deb
- Biochemistry Satyanarayan

#### **Practical Course:**

1. Invertebrate classification

Protozoa: Amoeba, Euglena, Paramoecium,

Porifera: Leucosolenia, bath sponge, hyalonema (glass rope sponge)

Coelenterata: Hydra, Obelia colony, Aurelia, any one coral

Platyhelminthes: Planaria, Liver fluke, Tapeworm Nematoda: Ascaris (male and female) Annelida: Earthworm, Leech, Nereis

Arthropoda: Crab, lobster, Lepisma, beetle, dragonfly, butterfly, spider,

centipede, millipede

Mollusca: Chiton, Dentalium, Pila, bivalve, Sepia, Nautilus

Echinodermata: Starfish, brittle star, sea urchin, sea cucumber, feather star

- 2. Mounting of Parapodium from Nereis
- 3. Mounting of Spicules from Sponge
- 4. Extraction and qualitative detection of nucleic acids: DNA (SDS-NaCl extraction), RNA (Phenol extraction)
- 5. Qualitative tests for proteins, lipids and carbohydrates.
- 6. Identification of crustacean and echinoderm larvae.
- 7. Study of types of shells and foot in Mollusca

## F.Y.B.Sc. Zoology

S.ZOO.1.02

#### **GENETICS AND EVOLUTION**

#### **Learning Objectives:**

- To understand the fundamentals of Mendelian genetics and its application
- > To understand the basic molecular mechanisms in Mendelian genetics
- > To be acquainted with the basics of evolution and the driving forces for the same

Number of lectures: 45

#### Unit 1

Mendelian Genetics (20 lectures)

- ➤ History of Mendelian genetics
- Concept of gene and allele in genetics.
- ➤ Concept of Dominance, Segregation and Independent Assortment
- > Mendelian Monohybrid inheritance.
- Exceptions to Monohybrid inheritance: Lethal genes, Co-dominance and Incomplete dominance.
- ➤ MendelianDihybrid inheritance.
- ➤ Variations of Dihybrid inheritance: Recessive Epistasis, Dominant Epistasis, Inhibitory gene interaction.
- ➤ Multiple Alleles: Concept. Human Blood group system and Coat colour in Rabbits: Understanding the emergence of these multiple allelic system
- > Cytoplasmic inheritance: Kappa particles in Paramecium, Shell coiling in Snails

#### Unit 2

Human Genetics (10 lectures)

- Mendelian genetics in humans: Autosomal Dominant inheritance: Huntington's Chorea disorder, Autosomal recessive inheritance: Phenylketonuria, X-linked recessive inheritance: Duchenne muscular dystrophy, X-linked Dominant inheritance: X-linked hypophosphatemic rickets.
- > Human pedigree analysis based on inheritance patterns.
- Chromosomal Abberations: Numerical abnormality: Monosomy Turner Syndrome; Tetrasomy/Trisomy – Down Syndrome.

#### Unit 3

**Evolution** (15 lectures)

- > Why study evolution
- > Theories of Evolution:
  - Prebiotic evolution
  - Panspermia
  - Biotic evolution
- ➤ Concept of Microevolution and Co-evolution
- ➤ Concept of Variation and Genetic drift in population
- Speciation mechanisms: Allopatric and Sympatric speciation
- > Isolating mechanisms in nature: Spatial, Ethological, Reproductive
- From water to land: the evolution of legs

1st Semester Syllabus for Core Courses in Zoology St. Xavier's College –Autonomous, Mumbai.

#### **Recommended References:**

- 1. Gentics Strickberger. CB publications
- 2. iGenetics Russel.
- 3. Genetics Gardener
- 4. Genetics Winchester. Oxford IBH publication
- 5. Principles of Genetic Sinnot, Dunn and Dobzansky. McGraw Hill Publication
- 6. Basic human genetics E.J.Mange and A.P.Mange. Rastogi Publication

# **Practical Course:**

- 1. Modification of feet in Birds
- 2. Modification of beaks in Birds
- 3. Study of fossil and living fossils: Ammonite, Trilobite, Lingula, Limulus
- 4. Human Pedigree analysis: X-linked recessive, X-linked dominant, autosomal dominant, autosomal recessive trait
- 5. Multiple alleles
- 6. Study of Geological Time Scales

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